STRUCTURAL FLOOR ANALYSIS

ROOM 1019
FEDERAL BUILDING
517 Gold Avenue, SW

Albuquerque
New Mexico

BPLW Architects & Engineers, Inc.
Albuquerque, New Mexico
Architect's Project Number: 91062.005

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INTRODUCTION

INTRODUCTION:

The purpose of this report is to explain the investigation, structural floor analysis, and the results of this analysis on room 1019 of the Federal building located at 517 Gold Avenue SW, Albuquerque, New Mexico. This report was requested by the General Services Administration, Design and Construction Division, Fort Worth, Texas through order number P-07-92-JU-0051.

SCOPE

SCOPE:

The investigation of room 1019 was prompted by the U.S. Forest Service's request to replace the current air handling unit in the room with a new one with a higher capacity. The structural investigation of the floor slab in room 1019 was to determine if the new air handling unit could be installed without causing the floor slab to become overstressed. The investigation consisted of a review of all data supplied by GSA, a site investigation, structural floor slab analysis, conclusions from the analysis, and recommendations on solutions to any inadequacies found during the analysis.

Copies of the original construction drawings of the building were supplied by GSA for a seismic analysis currently underway. These plans were used to determine the structural floor system of room 1019. The drawings show a two-way slab system supported by concrete columns at twenty-five feet on center. Reinforcement for the slabs is called out on the plans. This information was used to determine the load capacity of the floor.

The site investigation was performed on February 14, 1992 by our office. The site investigation was performed to gather additional data and to verify existing conditions of the floor slab and the loads imposed on it.

The structural floor slab analysis was performed by the equivalent frame method as prescribed by ACI 318-89 and PCA's "Notes on ACI 318-89, Building Code Requirements for Reinforced Concrete". Dead loads were taken from the plans mentioned earlier and from the data gathered during the site investigation. Live loads were taken from the Uniform Building Code, 1991 Edition.

Conclusions based on the structural analysis are presented in this report as are recommendations concerning the condition of the floor slab with regard to strength and serviceability.

PLAN REVIEW

PLAN REVIEW:

The plans supplied by GSA, as mentioned earlier, showed the floor slab to be a two-way concrete slab supported by concrete columns. The slab was indicated to be an 8" thick and having dropped panels (8'-4" x 8'-4" x 4" thick) at the columns.

The supplied plans are dated 1956, and are somewhat obscure as to the strengths of materials used. The reinforcing used was specified to comply with ASTM 305-49, an ASTM reference that has since changed to ASTM 615. However, ASTM 615 allows for two different grades of reinforcing, grade 40 with a yield strength of 40 ksi and grade 60 with a yield strength of 60 ksi. Since there was no reference to which grade of reinforcing was used, we assumed that it was grade 40, feeling that it was much more likely to have been used in 1957 than grade 60. Also rather obscure was the strength of the concrete specified for the floor slabs. The plans allowed for three strengths of concrete to be used on the building, 2500 psi, 3000 psi, and 3750 psi. The plans did call for the columns to be of 3750 psi concrete and the walls to be of 3000 psi concrete. We assumed that it was far more likely for the slabs to be the same strength as the walls, so the calculations were based on a concrete strength of 3000 psi. One other pertinent item that was fairly obscure on the plans was the floor slab reinforcement. No reinforcement was specifically called out for the floor slab at column lines "E" or "F" in the north-south direction. However, these column lines are fairly typical and were assumed to be reinforced the same as column line "D". This type of noting, noting one typical item and making the other typical ones the same, was common practice in old style plans.

SITE INVESTIGATION

SITE INVESTIGATION:

The site investigation was performed on February 14, 1992 to verify existing conditions of the floor slab and the loads. At the time of the site investigation, Room 1019 was being used by the U.S. Forest Service as a computer room to house a Data General MV40,000 main frame computer system. Data concerning the computer system, existing air handling unit, and other equipment in the room was gathered.

An access floor had been installed in the room. This would have allowed visual access to the floor slab itself if the access panels had not been covered by computer equipment. The equipment in the room was arranged in such a manner (photographs #1 - #3, Appendix A) that virtually none of the panels could be removed, and certainly not enough of the panels to allow a good overall view of the floor slab.

There was no obvious evidence of structural distress in the floor slab at the time of the site investigation.

The existing air handling unit (see right-hand side of photograph #4, Appendix A) was a Data model number CCT-15A2 manufactured by Airflow Company. The unit is currently situated along the south wall of the room.

STRUCTURAL ANALYSIS

STRUCTURAL ANALYSIS:

LOADS:

The loads generated and listed in Appendix B include the dead loads of the structure and fixed equipment in the vicinity of Room 1019. The structure dead loads were based on the plans supplied by GSA since no evidence to the contrary was discovered during the site investigation.

Investigation of Airflow Company's product literature revealed that the existing air handling unit weighs 2000 lbs. The weight of the new unit was taken from the U.S. Forest Service specifications supplied by GSA. The weight of the new unit was listed in those specifications as 2780 lbs. However, since the specifications indicated a specific unit as manufactured by Liebert or approved equal, the weight of the new unit was assumed to be 3000 lbs for the purpose of this analysis.

The weight of the main frame computer system was investigated by contacting the local office of Data General. Information provided by this source was sketchy at best. The weight of the system was referred to as "probably about 3000 lbs". Since the equipment appeared to be considerably heavier than this, the weight used for the purpose of this analysis was increased to 5000 lbs. This and the weights of the other equipment in the room are listed in Appendix B. The total load of the equipment was divided by the area of the room to provide a uniform load.

METHOD OF ANALYSIS:

The method of analysis used was the Equivalent Frame method as per ACI 318-89 (see Appendix B for calculations). This was used to calculate the floor slab stiffnesses at typical sections, dropped panels and at columns. The "equivalent frame" was then modeled on the computer to calculate the stresses in the slab and the columns. The stresses in the members were factored with appropriate ACI load factors in load combinations #1 and #2. Deflections were also calculated by the computer program, but these are based on the gross moment of inertia, not the effective moment of inertia and are thus underestimated. The factored stresses calculated by the computer program were then compared to the ultimate moment capacity of the member.

RESULTS

RESULTS:

The results of the analysis revealed that the slab was overstressed when all loads were used, so a fifth load combination was added representing only factored dead and live loads. This revealed that the loads of the equipment in the room actually contribute very little to the stresses in the floor slab. The majority of the stresses, approximately 95%, was caused by structure dead loads and UBC prescribed live loads.

Still, the results of the analysis were surprising. They indicated that under only dead and live loads the floor slab was overstressed. Considering the fact that the building has survived 35 years of use, the results were assumed to be in error. The results from the computer analysis were then checked by hand, using the moment distribution method illustrated in PCA's "Notes on ACI 318-89, Building Code Requirements for Reinforced Concrete". To simplify this analysis, all of the columns were assumed to be the same size as the interior columns below the first floor. This caused the moments calculated by this method to be slightly different from the computer analysis. However, the moments at the center column line, column line 3, were only about 4% different from the computer results. This served to verify that the results from the computer analysis were indeed correct. The results indicated that the floor slab was overstressed when loaded with the live load prescribed by the Uniform Building Code.

CONCLUSIONS

CONCLUSIONS:

Several conclusions can be deduced from the results of this analysis. It is possible that the actual material properties used in the building exceeded those indicated on the plans. This would have increased the capacity of the slab. However, since no material testing was allowed for with this contract, it is not possible to determine the actual material properties nor the actual capacity of the slab.

Another possibility is that the floor in this area of the building has never experienced the full UBC live load. The indicated 50 psf for offices is generally a conservative figure, especially for an area such as this one, where there are relatively few people who actually work in the room.

A third conclusion that can be drawn from these results is that the slab has actually been overstressed. Two-way slab systems are very forgiving when it comes to a certain area becoming overstressed. Moments are redistributed to other areas of the system so that many areas have to become overstressed before an actual collapse occurs. However, no evidence of the slab being severely overstressed was observed during the site investigation.

RECOMMENDATIONS

RECOMMENDATIONS:

It is apparent from the results of this analysis that there is a good chance that the floor slab in Room 1019 would not withstand the loads that the Uniform Building Code requires that it withstand. However, it is not possible to determine if the actual capacity without testing the materials actually used for the structure. Therefore, the first recommendation would be to have the existing materials tested to determine their actual structural properties. This should be done not only for Room 1019, but also for the entire building.

The second recommendation would be to have the entire building be analyzed for gravity loads given the results of the material testing. This is the only way to determine if the structure poses a threat to the safety of the occupants. If the building does not meet the requirements of the Uniform Building Code, then a method of upgrading the structure to do so should be researched and enacted. Until such time as this can be accomplished, measures should be taken by the building manager to insure that the floor live load in any part of the building does not reach 50 psf.

With regard to the primary purpose of this report, that of determining if the floor could withstand the additional load induced by the installation of a larger air handling unit, the analysis revealed that the additional load would not increase the existing stresses in the slab to such a degree as to cause concern. The new unit may be installed.

APPENDIX A

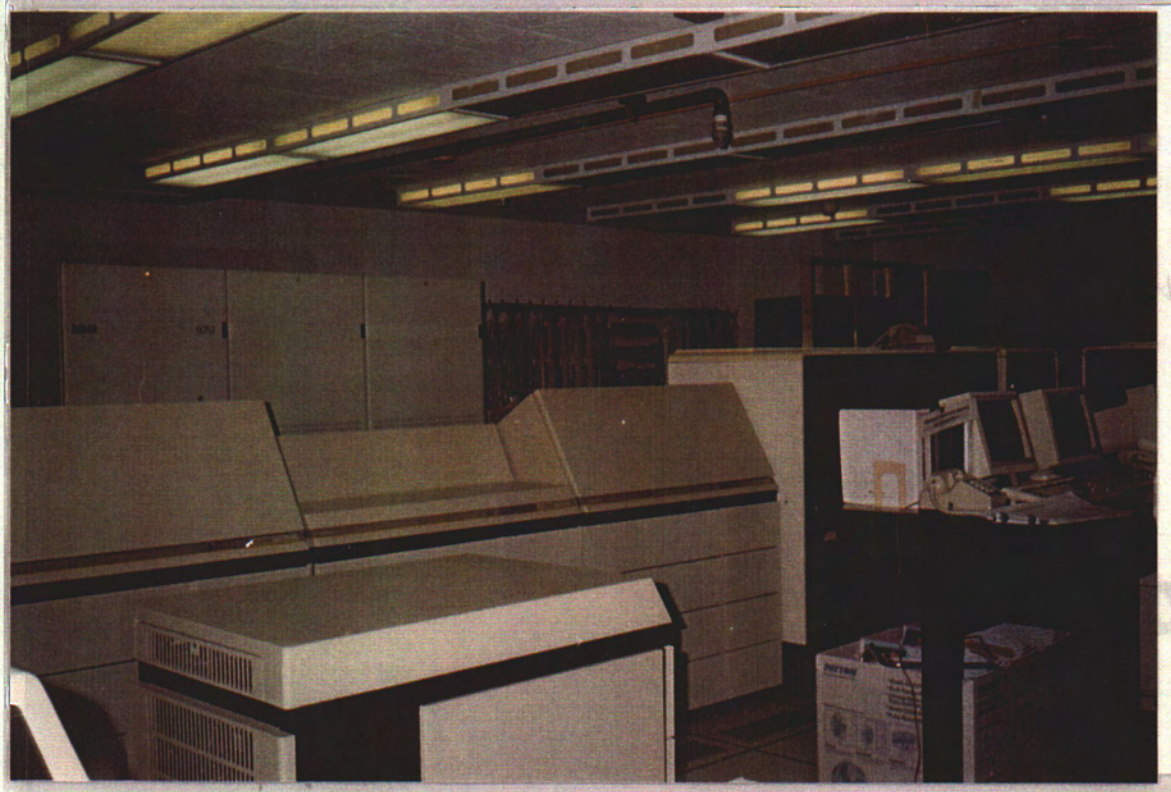
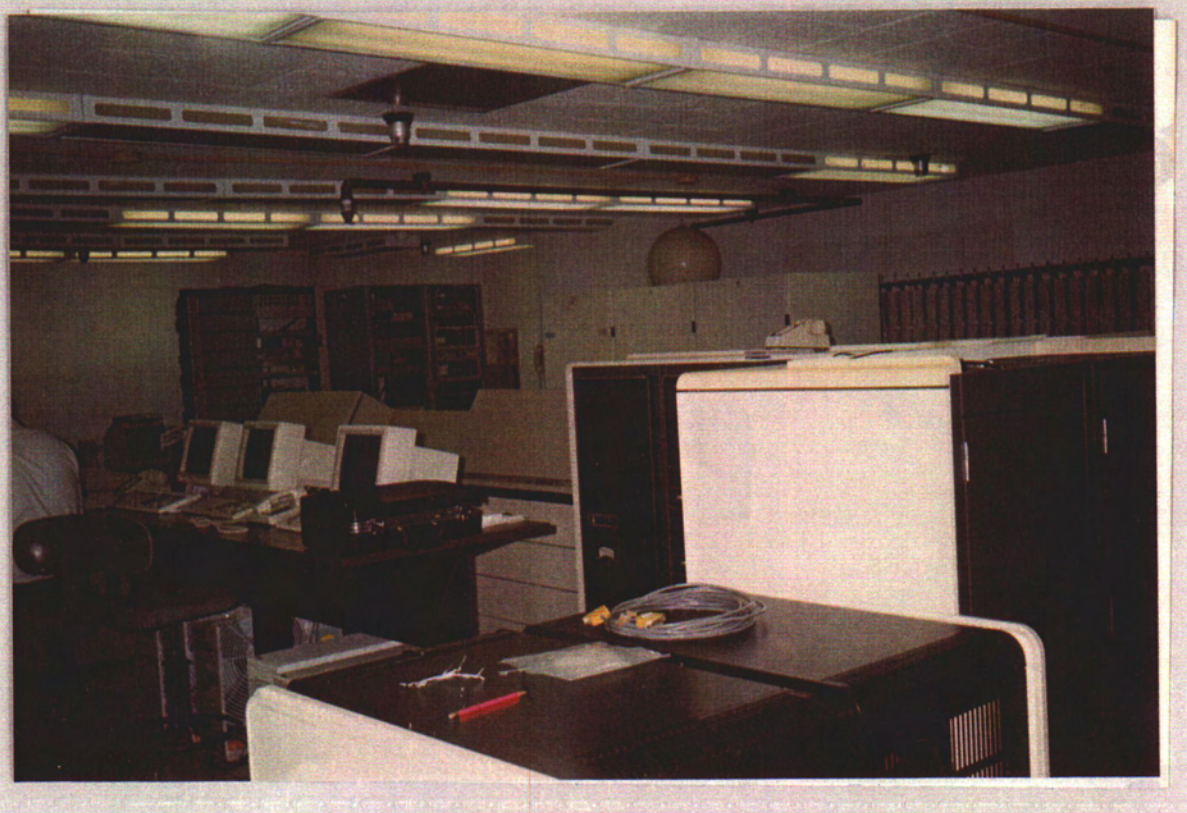


PHOTO #1 ↑

PHOTO #2 ↓



C-LINE #52564
4"x6" PRINTS

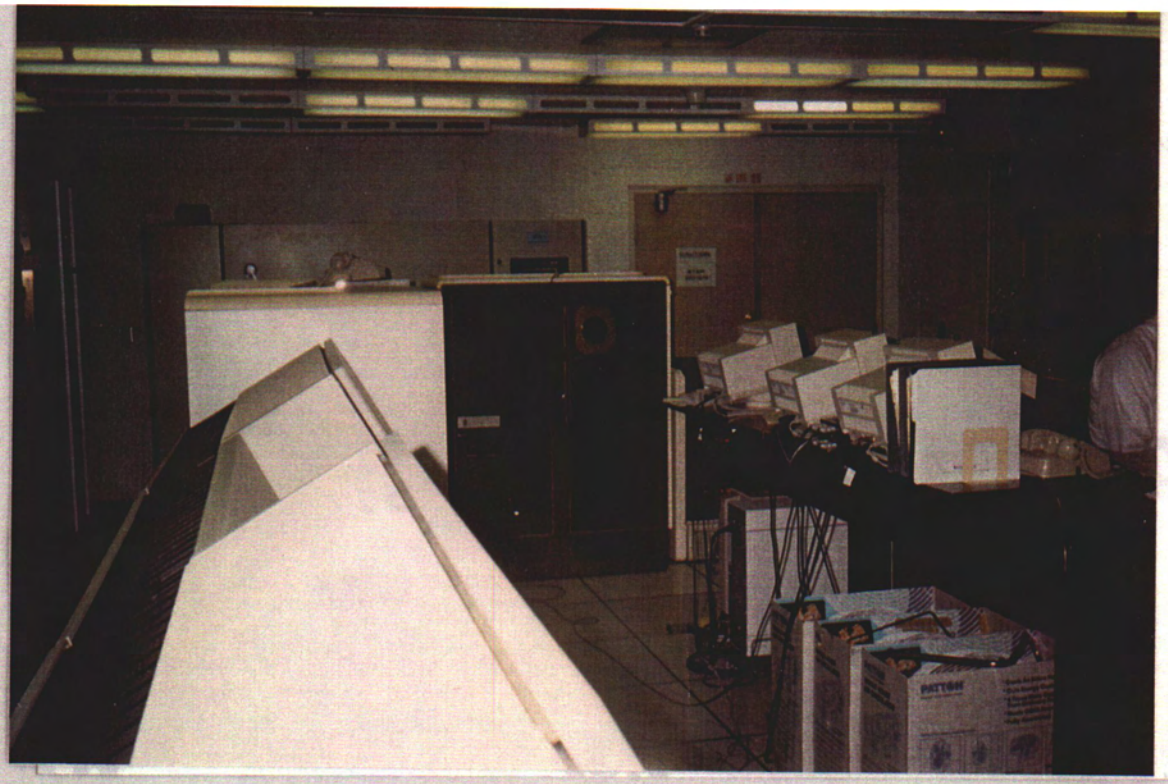
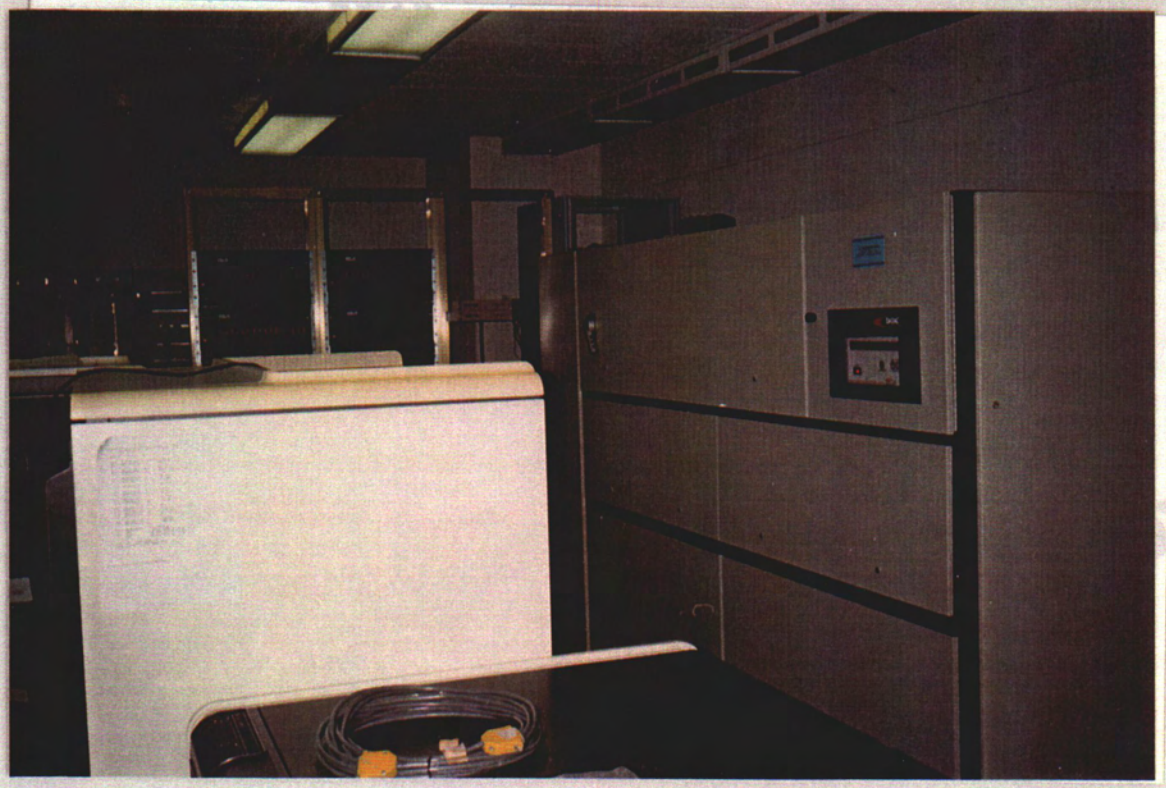


PHOTO #3 ↑

PHOTO #4 ↓



APPENDIX B

BPLW
Architects & Engineers, Inc.
2400 Louisiana Blvd. NE
NC #5 Suite 400
Albuquerque, NM 87110
(505) 881-2759
63 East Main Street
Suite 602
Mesa, AZ 85201
(602) 827-2759

Project _____
Subject _____
Project No. 91062.005 Date 3/3/92 By JMW

☐ Memorandum
☐ Telephone record
☐ Note to the file
☐ Minutes of meeting
☐ To be typed
☐ _____

FLOOR LOADS:

DEAD: 8" SLAB	=	100 psf
PARTITIONS	=	15 psf
SUSPENDED CEILING	=	14 psf
MECH	=	4 psf
ELEC	=	3 psf
ACCESS FLR	=	10 psf
		146 psf

LIVE: COMPUTER ROOM	=	50 psf
STORAGE	=	125 psf

COMPUTER EQUIPMENT: CPU MVH40, POWER CENTER, MERC, CAB #1-#4	=	5000#
RAM DISK	=	200#
CONSOLE TABLE	=	250#
CAB, DISK, DISK	=	500#
UTILITY TABLE, 6300TO, 8MMCTD, POWER COND.	=	500#
LINE PRINTER	=	150#
Comm EQUIP.	=	500#
TEL. SWITCH	=	500#
COMM EQUIP	=	500#
ROLM 9751	=	1000#
		9100#

FLR. AREA ≈ 25'x33' = 825 SF.

Copies to:

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- ☐ _____

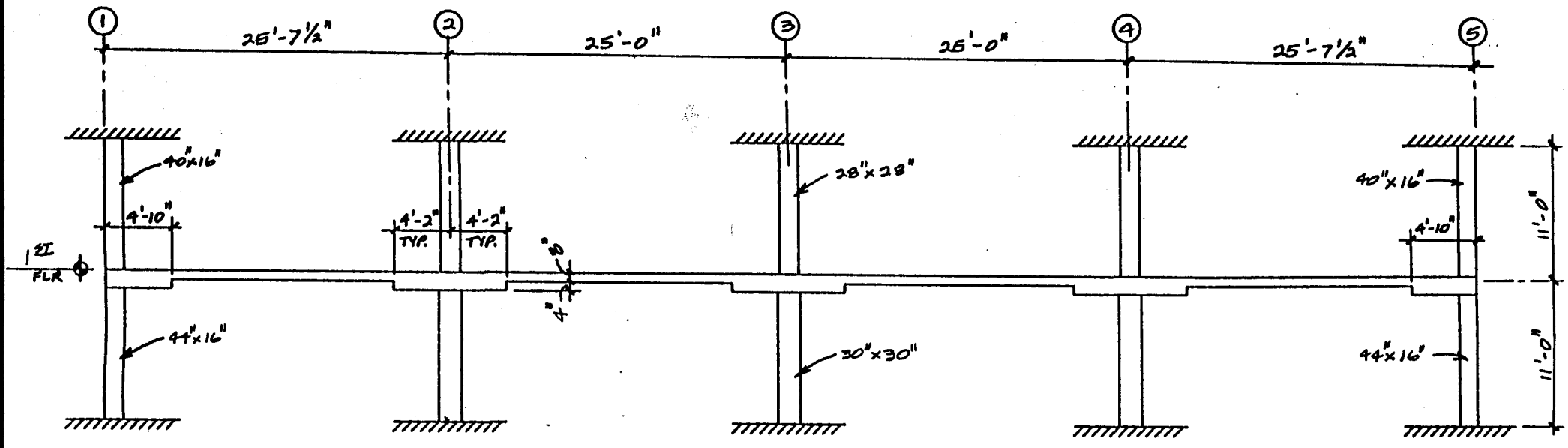
FLOOR LOADS - CONT'D

UNIFORM LOAD FROM COMPUTER EQUIP. = $\frac{9100}{825} = 11$ psf

SAY 15psf

HVAC UNIT = 3000#

Copies to:



TYPICAL SLAB-BEAM CONFIGURATION

BPLW
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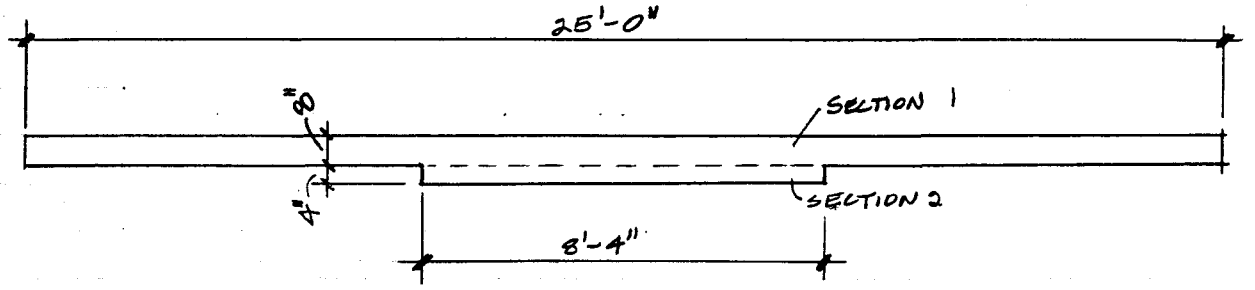
- ☐ _____



SECTION	AREA	$\bar{y}$	$A\bar{y}$
1	2400	8	19200
2	400	2	800
	2800		20,000

$$\bar{y} = \frac{20000}{2800} = 7.14"$$

$$I = 12800 + 2400\,(.86)^2 + 533 + 400\,(5.14)^2$$

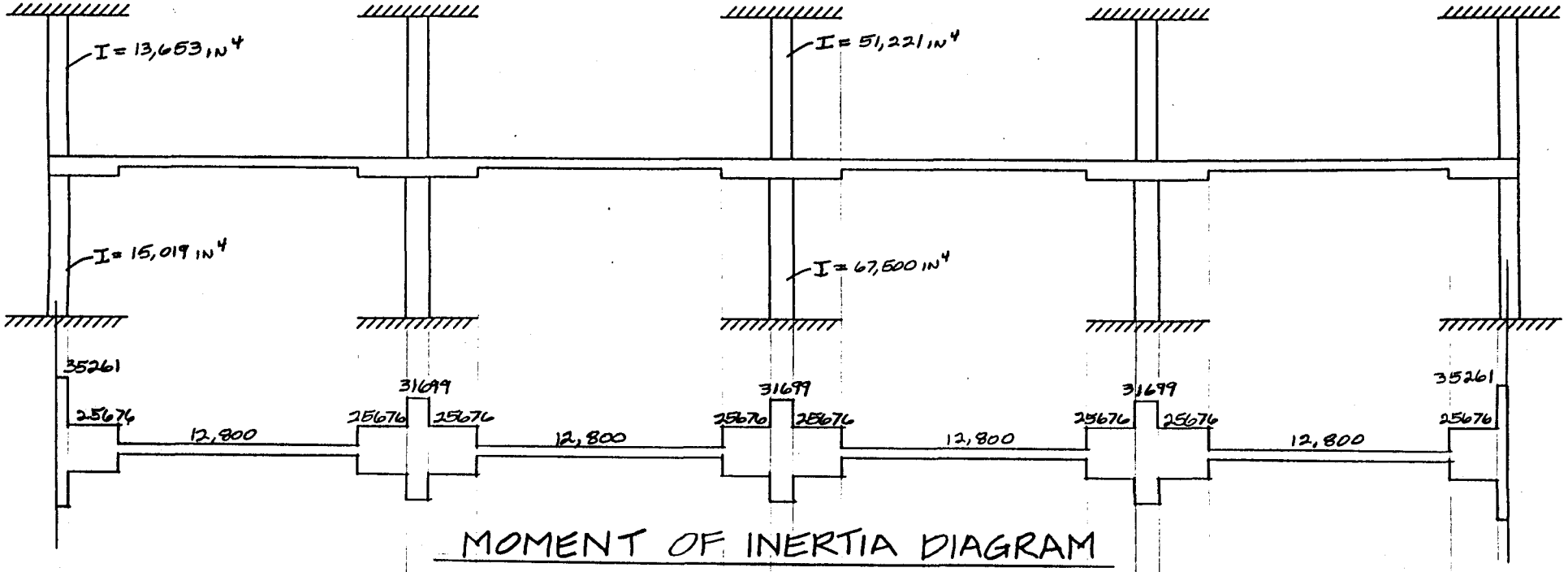
$$I = 25676\ in^4$$

Copies to:

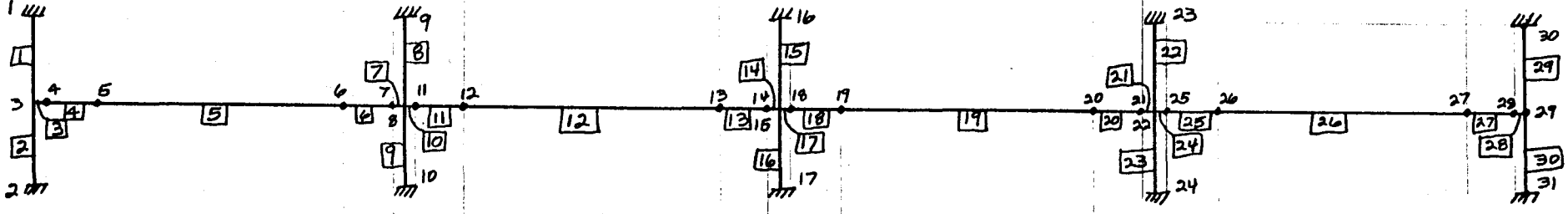
l_2 = 25'

$E_{cs} = 3.122 \times 10^6$ psi

$E_{cc} = 3.491 \times 10^6$ psi



MOMENT OF INERTIA DIAGRAM

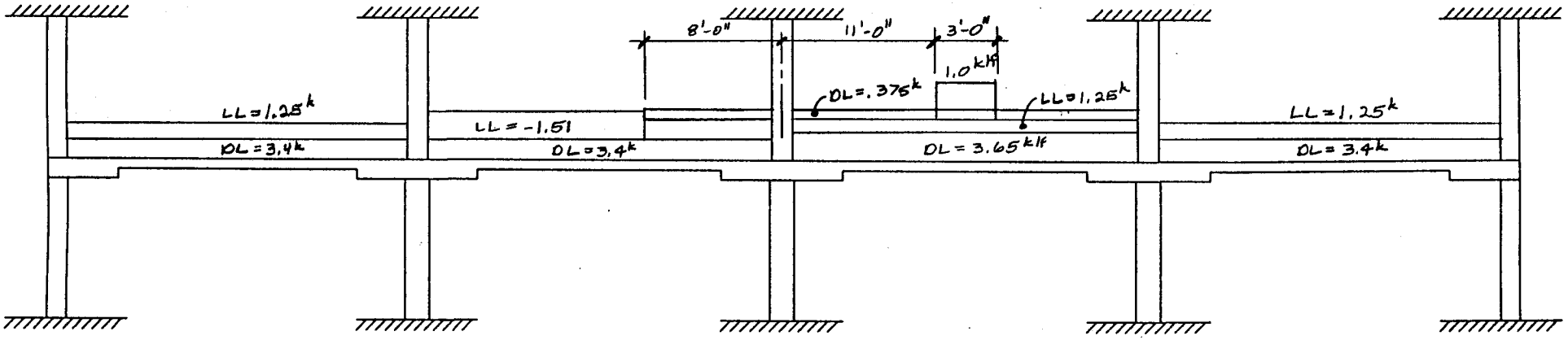


NODE: $\overset{3}{\bullet}$ OR $\overset{3}{+}$

ELEMENT: [3]

FIXED SUPPORT

COMPUTER MODEL



LOADING DIAGRAM

N O D A L I N F O R M A T I O N

NODE NO	NODAL COORDINATES X	Y	SUPPORT CONDITIONS CODE	PX STIFF	PY STIFF	M STIFF
	Units : Ft	Ft		K /In	K /In	K -In /Deg
1	0.000	22.000	F			
2	0.000	0.000	F			
3	0.000	11.000				
4	0.830	11.000				
5	4.830	11.000				
6	20.830	11.000				
7	24.170	11.000				
8	25.000	11.000				
9	25.000	22.000	F			
10	25.000	0.000	F			
11	25.830	11.000				
12	29.170	11.000				
13	45.840	11.000				
14	49.170	11.000				
15	50.000	11.000				
16	50.000	22.000	F			
17	50.000	0.000	F			
18	50.830	11.000				
19	54.160	11.000				
20	70.830	11.000				
21	74.170	11.000				
22	75.000	11.000				
23	75.000	22.000	F			
24	75.000	0.000	F			
25	75.830	11.000				
26	79.170	11.000				
27	95.170	11.000				
28	99.170	11.000				
29	100.000	11.000				
30	100.000	22.000	F			
31	100.000	0.000	F			

E L E M E N T I N F O R M A T I O N

ELEM NO	NE NODE	FE NODE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	FE HINGE
		Units : Ft		Deg				
1	3	1	11.000	90.00	8	BEAM		
2	2	3	11.000	90.00	6	BEAM		
3	3	4	0.830	0.00	4	BEAM		
4	4	5	4.000	0.00	2	BEAM		
5	5	6	16.000	0.00	1	BEAM		
6	6	7	3.340	0.00	2	BEAM		
7	7	8	0.830	0.00	3	BEAM		

INC.
BSA COMPUTER ROOM 1019 - SLAB BEAM F

UN : 1

E L E M E N T I N F O R M A T I O N

ELEM NO	NE NODE	PE NODE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	PE HINGE
8	8	9	11.000	90.00	7	BEAM		
9	10	8	11.000	90.00	5	BEAM		
10	8	11	0.830	0.00	3	BEAM		
11	11	12	3.340	0.00	2	BEAM		
12	12	13	16.670	0.00	1	BEAM		
13	13	14	3.330	0.00	2	BEAM		
14	14	15	0.830	0.00	3	BEAM		
15	15	16	11.000	90.00	7	BEAM		
16	17	15	11.000	90.00	5	BEAM		
17	15	18	0.830	0.00	3	BEAM		
18	18	19	3.330	0.00	2	BEAM		
19	19	20	16.670	0.00	1	BEAM		
20	20	21	3.340	0.00	2	BEAM		
21	21	22	0.830	0.00	3	BEAM		
22	22	23	11.000	90.00	7	BEAM		
23	24	22	11.000	90.00	5	BEAM		
24	22	25	0.830	0.00	3	BEAM		
25	25	26	3.340	0.00	2	BEAM		
26	26	27	16.000	0.00	1	BEAM		
27	27	28	4.000	0.00	2	BEAM		
28	28	29	0.830	0.00	4	BEAM		
29	29	30	11.000	90.00	8	BEAM		
30	31	29	11.000	90.00	6	BEAM		

P R O P E R T Y I N F O R M A T I O N

PROP ID	SECTION NAME	MODULUS	AREA	I	DIST
	Units :	K /In 2	In2	In4	Ft
1	SLAB BEAM ONLY	3.1e+003	2.4e+003	1.28e+004	
2	SLAB BEAM @ DROP PAN	3.1e+003	2.8e+003	2.57e+004	
3	S.B. @ INT. COLUMNS	3.1e+003	2.8e+003	3.17e+004	
4	S.B. @ EXT. COLUMNS	3.1e+003	2.8e+003	3.53e+004	
5	BASEMENT INT. COLUMN	3.5e+003	900	6.75e+004	
6	BASEMENT EXT. COLUMN	3.5e+003	704	1.5e+004	
7	1ST FLOOR INT. COLUM	3.5e+003	784	5.12e+004	
8	1ST FLOOR EXT. COLUM	3.5e+003	640	1.37e+004	

E L E M E N T L O A D I N F O R M A T I O N

REC ID	LOAD CASE	LOAD TYPE	LOAD SYS	DIST SPEC	DIST	PX	PY	M
				Units :	Ft	K /Ft	K /Ft	Ft-K /Ft

E L E M E N T L O A D I N F O R M A T I O N

REC NO	LOAD CASE	LOAD TYPE	LOAD SYS	DIST SPEC		DIST	PX	PY	M
escription : DL									
ement List : 3-7.10-14.24-28									
1	1	UNIF	GLO	FRAC	B	0.00	0.00	-3.40	0.00
					E	1.00	0.00	-3.40	0.00
escription : DL									
ement List : 17-21									
2	1	UNIF	GLO	FRAC	B	0.00	0.00	-3.65	0.00
					E	1.00	0.00	-3.65	0.00
escription : LL									
ement List : 3-7.17-21.24-28.13.14									
3	2	UNIF	GLO	FRAC	B	0.00	0.00	-1.25	0.00
					E	1.00	0.00	-1.25	0.00
escription : LL STORAGE									
ement List : 10.11									
4	2	UNIF	GLO	FRAC	B	0.00	0.00	-1.51	0.00
					E	1.00	0.00	-1.51	0.00
escription : LL STORAGE									
ement List : 12									
5	2	UNIF	GLO	FRAC	B	0.00	0.00	-1.51	0.00
					E	0.80	0.00	-1.51	0.00
escription : LL									
ement List : 12									
6	2	UNIF	GLO	FRAC	B	0.80	0.00	-1.25	0.00
					E	1.00	0.00	-1.25	0.00
escription : COMPUTERS									
ement List : 17-21									
7	3	UNIF	GLO	FRAC	B	0.00	0.00	-0.38	0.00
					E	1.00	0.00	-0.38	0.00
escription : AHU									
ement List : 19									
8	4	UNIF	GLO	FRAC	B	0.41	0.00	-1.00	0.00
					E	0.59	0.00	-1.00	0.00
escription : DESIGN LL									
ement List : 3-7.10-14.17-21.24-28									
9	5	UNIF	GLO	FRAC	B	0.00	0.00	-1.25	0.00
					E	1.00	0.00	-1.25	0.00

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	Units :	In	In	Deg

OAD COMBINATIONS:

OMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2
+ 1.40 X CASE 3
+ 1.40 X CASE 4

OMB 2 : 1.40 X CASE 1
+ 1.70 X CASE 2
+ 1.70 X CASE 3
+ 1.70 X CASE 4

OMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2
+ 1.00 X CASE 3
+ 1.00 X CASE 4

OMB 4 : 1.00 X CASE 1
+ 1.00 X CASE 2
+ 1.00 X CASE 3

OMB 5 : 1.40 X CASE 1
+ 1.70 X CASE 5

1	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
2	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
3	1	0.0002	-0.0023	-0.0730
	2	0.0002	-0.0023	-0.0730
	3	0.0001	-0.0015	-0.0493
	4	0.0001	-0.0015	-0.0493
	5	0.0001	-0.0023	-0.0732
4	1	0.0002	-0.0166	-0.0910
	2	0.0002	-0.0166	-0.0910

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	3	0.0001	-0.0112	-0.0615
	4	0.0001	-0.0112	-0.0615
	5	0.0001	-0.0166	-0.0912
5	1	0.0001	-0.1215	-0.1424
	2	0.0001	-0.1215	-0.1425
	3	0.0001	-0.0821	-0.0962
	4	0.0001	-0.0821	-0.0962
	5	0.0001	-0.1217	-0.1428
6	1	0.0001	-0.0619	0.1137
	2	0.0001	-0.0619	0.1137
	3	0.0001	-0.0419	0.0769
	4	0.0001	-0.0419	0.0769
	5	0.0001	-0.0626	0.1144
7	1	0.0001	-0.0069	0.0296
	2	0.0001	-0.0069	0.0296
	3	0.0001	-0.0046	0.0201
	4	0.0001	-0.0046	0.0201
	5	0.0000	-0.0069	0.0307
8	1	0.0001	-0.0041	0.0012
	2	0.0001	-0.0041	0.0012
	3	0.0001	-0.0028	0.0009
	4	0.0000	-0.0028	0.0009
	5	0.0000	-0.0040	0.0024
9	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
10	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
11	1	0.0001	-0.0063	-0.0256
	2	0.0001	-0.0063	-0.0256
	3	0.0000	-0.0042	-0.0171

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	4	0.0000	-0.0042	-0.0171
	5	0.0000	-0.0059	-0.0231
12	1	0.0001	-0.0560	-0.1024
	2	0.0001	-0.0559	-0.1023
	3	0.0000	-0.0374	-0.0685
	4	0.0000	-0.0375	-0.0687
	5	0.0000	-0.0522	-0.0963
13	1	0.0000	-0.0544	0.1007
	2	0.0000	-0.0541	0.1004
	3	0.0000	-0.0364	0.0675
	4	0.0000	-0.0368	0.0678
	5	0.0000	-0.0528	0.0966
14	1	0.0000	-0.0062	0.0241
	2	0.0000	-0.0061	0.0236
	3	0.0000	-0.0041	0.0160
	4	0.0000	-0.0042	0.0165
	5	0.0000	-0.0060	0.0243
15	1	0.0000	-0.0042	-0.0025
	2	0.0000	-0.0043	-0.0030
	3	0.0000	-0.0029	-0.0019
	4	0.0000	-0.0028	-0.0013
	5	0.0000	-0.0040	-0.0010
16	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
17	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
18	1	0.0000	-0.0073	-0.0319
	2	0.0000	-0.0075	-0.0331
	3	0.0000	-0.0050	-0.0219
	4	0.0000	-0.0048	-0.0207

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	0.0000	-0.0065	-0.0275
19	1	0.0000	-0.0643	-0.1163
	2	0.0000	-0.0660	-0.1193
	3	0.0000	-0.0439	-0.0794
	4	0.0000	-0.0419	-0.0757
	5	-0.0000	-0.0568	-0.1030
20	1	-0.0000	-0.0637	0.1159
	2	-0.0001	-0.0654	0.1189
	3	-0.0000	-0.0435	0.0791
	4	-0.0000	-0.0415	0.0754
	5	-0.0000	-0.0558	0.1023
21	1	-0.0001	-0.0071	0.0306
	2	-0.0001	-0.0073	0.0318
	3	-0.0000	-0.0049	0.0210
	4	-0.0000	-0.0047	0.0197
	5	-0.0001	-0.0063	0.0255
22	1	-0.0001	-0.0043	0.0010
	2	-0.0001	-0.0043	0.0015
	3	-0.0000	-0.0029	0.0008
	4	-0.0000	-0.0029	0.0003
	5	-0.0001	-0.0041	-0.0013
23	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
24	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
25	1	-0.0001	-0.0067	-0.0276
	2	-0.0001	-0.0066	-0.0271
	3	-0.0000	-0.0045	-0.0185
	4	-0.0000	-0.0045	-0.0190
	5	-0.0001	-0.0068	-0.0297

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
26	1	-0.0001	-0.0605	-0.1123
	2	-0.0001	-0.0602	-0.1120
	3	-0.0001	-0.0408	-0.0758
	4	-0.0000	-0.0412	-0.0761
	5	-0.0001	-0.0620	-0.1138
27	1	-0.0001	-0.1210	0.1418
	2	-0.0001	-0.1209	0.1416
	3	-0.0001	-0.0817	0.0957
	4	-0.0001	-0.0818	0.0959
	5	-0.0001	-0.1215	0.1425
28	1	-0.0001	-0.0165	0.0907
	2	-0.0001	-0.0165	0.0906
	3	-0.0001	-0.0112	0.0612
	4	-0.0001	-0.0112	0.0613
	5	-0.0001	-0.0166	0.0910
29	1	-0.0001	-0.0023	0.0727
	2	-0.0001	-0.0023	0.0727
	3	-0.0001	-0.0015	0.0491
	4	-0.0001	-0.0015	0.0492
	5	-0.0001	-0.0023	0.0730
30	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
31	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000

E L E M E N T R E P O R T S

ELEM NO	LOAD COMB	NODE NO	SIGN CONVENTION : BEAM DESIGNERS AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
		Units :	K	K	K -Ft	K -Ft /In	Ft

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST

DA COMBINATIONS:

OMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2
+ 1.40 X CASE 3
+ 1.40 X CASE 4

OM 2 : 1.40 X CASE 1
+ 1.70 X CASE 2
+ 1.70 X CASE 3
+ 1.70 X CASE 4

OMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2
+ 1.00 X CASE 3
+ 1.00 X CASE 4

OM 4 : 1.00 X CASE 1
+ 1.00 X CASE 2
+ 1.00 X CASE 3

OMB 5 : 1.40 X CASE 1
+ 1.70 X CASE 5

1	1	3	38.5914	-20.9557	153.6046		
		1	38.5914	-20.9557	-76.9081	-0.0249	3.66
	2	3	38.5919	-20.9566	153.6106		
		1	38.5919	-20.9566	-76.9120	-0.0249	3.66
	3	3	26.0672	-14.1564	103.7668		
		1	26.0672	-14.1564	-51.9536	-0.0168	3.67
	4	3	26.0666	-14.1554	103.7599		
		1	26.0666	-14.1554	-51.9492	-0.0168	3.67
	5	3	38.6254	-20.9867	153.8464		
		1	38.6254	-20.9867	-77.0078	-0.0250	3.67
2	1	2	-42.4505	-22.9677	84.1373		
		3	-42.4505	-22.9677	-168.5074	0.0249	7.33
	2	2	-42.4511	-22.9680	84.1376		
		3	-42.4511	-22.9680	-168.5100	0.0249	7.33
	3	2	-28.6739	-15.5166	56.8427		
		3	-28.6739	-15.5166	-113.8398	0.0168	7.33

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

EL M NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	2	-28.6733	-15.5163	56.8423		
		3	-28.6733	-15.5163	-113.8368	0.0168	7.33
	5	2	-42.4879	-23.0188	84.3402		
		3	-42.4879	-23.0188	-168.8666	0.0250	7.33
3	1	3	-2.0120	81.0419	-322.1120		
		4	-2.0120	75.3274	-257.2187	0.0004	0.41
	2	3	-2.0114	81.0430	-322.1206		
		4	-2.0114	75.3284	-257.2265	0.0004	0.41
	3	3	-1.3602	54.7411	-217.6066		
		4	-1.3602	50.8816	-173.7731	0.0003	0.41
	4	3	-1.3609	54.7400	-217.5967		
		4	-1.3609	50.8805	-173.7643	0.0003	0.41
	5	3	-2.0321	81.1133	-322.7130		
		4	-2.0321	75.3988	-257.7605	0.0004	0.41
4	1	4	-2.0120	75.3274	-257.2187		
		5	-2.0120	47.7874	-10.9891	0.0054	1.68
	2	4	-2.0114	75.3284	-257.2265		
		5	-2.0114	47.7884	-10.9929	0.0054	1.68
	3	4	-1.3602	50.8816	-173.7731		
		5	-1.3602	32.2816	-7.4467	0.0037	1.68
	4	4	-1.3609	50.8805	-173.7643		
		5	-1.3609	32.2805	-7.4425	0.0037	1.68
	5	4	-2.0321	75.3988	-257.7605		
		5	-2.0321	47.8588	-11.2453	0.0054	1.69
5	1	5	-2.0120	47.7874	-10.9891	154.8522	6.94
		6	-2.0120	-62.3726	-127.6708	-0.1590	7.49
	2	5	-2.0114	47.7884	-10.9929	154.8556	6.94
		6	-2.0114	-62.3716	-127.6582	-0.1590	7.49
	3	5	-1.3602	32.2816	-7.4467	104.6074	6.94
		6	-1.3602	-42.1184	-86.1408	-0.1074	7.49

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	5	-1.3609	32.2805	-7.4425	104.6035	6.94
		6	-1.3609	-42.1195	-86.1552	-0.1074	7.49
	5	5	-2.0321	47.8588	-11.2453	155.0919	6.95
		6	-2.0321	-62.3012	-126.7847	-0.1594	7.50
6	1	6	-2.0120	-62.3726	-127.6708		
		7	-2.0120	-85.3685	-374.3985	0.0074	1.81
	2	6	-2.0114	-62.3716	-127.6582		
		7	-2.0114	-85.3675	-374.3825	0.0074	1.81
	3	6	-1.3602	-42.1184	-86.1408		
		7	-1.3602	-57.6494	-252.7530	0.0050	1.81
	4	6	-1.3609	-42.1195	-86.1552		
		7	-1.3609	-57.6505	-252.7712	0.0050	1.81
	5	6	-2.0321	-62.3012	-126.7847		
		7	-2.0321	-85.2971	-373.2739	0.0073	1.81
7	1	7	-2.0120	-85.3685	-374.3985		
		8	-2.0120	-91.0831	-447.6259	0.0006	0.42
	2	7	-2.0114	-85.3675	-374.3825		
		8	-2.0114	-91.0820	-447.6090	0.0006	0.42
	3	7	-1.3602	-57.6494	-252.7530		
		8	-1.3602	-61.5089	-302.2037	0.0004	0.42
	4	7	-1.3609	-57.6505	-252.7712		
		8	-1.3609	-61.5100	-302.2229	0.0004	0.42
	5	7	-2.0321	-85.2971	-373.2739		
		8	-2.0321	-91.0117	-446.4421	0.0006	0.42
8	1	8	84.9121	1.2389	-9.2192		
		9	84.9121	1.2389	4.4088	0.0004	3.72
	2	8	84.8956	1.2547	-9.3375		
		9	84.8956	1.2547	4.4644	0.0004	3.72
	3	8	57.1256	0.9558	-7.0963		
		9	57.1256	0.9558	3.4173	0.0003	3.71

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	8	57.1442	0.9378	-6.9620		
		9	57.1442	0.9378	3.3540	0.0003	3.71
	5	8	82.4860	2.4838	-18.2942		
		9	82.4860	2.4838	9.0277	0.0008	3.68
9	1	10	-97.4756	1.8251	-6.8686		
		8	-97.4756	1.8251	13.2079	-0.0004	7.38
	2	10	-97.4567	1.8493	-6.9604		
		8	-97.4567	1.8493	13.3822	-0.0004	7.38
	3	10	-65.5778	1.3850	-5.1933		
		8	-65.5778	1.3850	10.0416	-0.0003	7.37
	4	10	-65.5992	1.3576	-5.0892		
		8	-65.5992	1.3576	9.8438	-0.0003	7.37
	5	10	-94.6905	3.3876	-12.5263		
		8	-94.6905	3.3876	24.7378	-0.0008	7.35
0	1	8	-1.4258	91.3046	-425.1988		
		11	-1.4258	85.2232	-351.9398	0.0006	0.41
	2	8	-1.4168	91.2702	-424.8893		
		11	-1.4168	85.1888	-351.6588	0.0006	0.41
	3	8	-0.9310	61.1945	-285.0657		
		11	-0.9310	57.1192	-235.9655	0.0004	0.41
	4	8	-0.9412	61.2334	-285.4170		
		11	-0.9412	57.1581	-236.2845	0.0004	0.41
	5	8	-1.1282	86.1649	-403.4101		
		11	-1.1282	80.4503	-334.2648	0.0006	0.41
1	1	11	-1.4258	85.2232	-351.9398		
		12	-1.4258	60.7510	-108.1629	0.0067	1.52
	2	11	-1.4168	85.1888	-351.6588		
		12	-1.4168	60.7166	-107.9969	0.0067	1.52
	3	11	-0.9310	57.1192	-235.9655		
		12	-0.9310	40.7198	-72.5744	0.0045	1.52

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

EL NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	11	-0.9412	57.1581	-236.2845		
		12	-0.9412	40.7587	-72.7633	0.0045	1.82
	5	11	-1.1282	80.4503	-334.2648		
		12	-1.1282	57.4544	-103.9639	0.0064	1.82
12	1	12	-1.4258	60.7510	-108.1629	143.6921	8.29
		13	-1.4258	-59.9312	-111.0821	-0.1522	8.31
	2	12	-1.4168	60.7166	-107.9969	143.5730	8.29
		13	-1.4168	-59.9656	-111.4895	-0.1520	8.31
	3	12	-0.9310	40.7198	-72.5744	96.2753	8.29
		13	-0.9310	-40.2717	-74.5760	-0.1019	8.31
	4	12	-0.9412	40.7587	-72.7633	96.4092	8.30
		13	-0.9412	-40.2328	-74.1162	-0.1021	8.32
	5	12	-1.1282	57.4544	-103.9639	135.7609	8.34
		13	-1.1282	-57.3185	-102.8312	-0.1440	8.34
3	1	13	-1.4258	-59.9312	-111.0821		
		14	-1.4258	-82.8582	-348.8265	0.0067	1.81
	2	13	-1.4168	-59.9656	-111.4895		
		14	-1.4168	-82.8926	-349.3485	0.0067	1.81
	3	13	-0.9310	-40.2717	-74.5760		
		14	-0.9310	-55.7562	-234.4625	0.0045	1.81
	4	13	-0.9412	-40.2328	-74.1162		
		14	-0.9412	-55.7173	-233.8731	0.0045	1.81
	5	13	-1.1282	-57.3185	-102.8312		
		14	-1.1282	-80.2456	-331.8754	0.0063	1.81
4	1	14	-1.4258	-82.8582	-348.8265		
		15	-1.4258	-88.5728	-419.9704	0.0006	0.42
	2	14	-1.4168	-82.8926	-349.3485		
		15	-1.4168	-88.6072	-420.5209	0.0006	0.42
	3	14	-0.9310	-55.7562	-234.4625		
		15	-0.9310	-59.6157	-282.3418	0.0004	0.42

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	14	-0.9412	-55.7173	-233.8731		
		15	-0.9412	-59.5768	-281.7201	0.0004	0.42
	5	14	-1.1282	-80.2456	-331.8754		
		15	-1.1282	-85.9601	-400.8508	0.0006	0.42
15	1	15	87.3612	-2.7109	19.8388		
		16	87.3612	-2.7109	-9.9807	-0.0009	3.66
	2	15	88.2503	-3.2481	23.7757		
		16	88.2503	-3.2481	-11.9536	-0.0010	3.66
	3	15	59.1421	-2.0504	15.0100		
		16	59.1421	-2.0504	-7.5448	-0.0006	3.66
	4	15	58.3960	-1.4477	10.5931		
		16	58.3960	-1.4477	-5.3314	-0.0005	3.66
	5	15	82.0428	-1.1089	8.1258		
		16	82.0428	-1.1089	-4.0719	-0.0004	3.66
6	1	17	-100.2870	-3.5136	12.8294		
		15	-100.2870	-3.5136	-25.8205	0.0009	7.33
	2	17	-101.3077	-4.2174	15.4062		
		15	-101.3077	-4.2174	-30.9856	0.0010	7.33
	3	17	-67.8928	-2.6640	9.7329		
		15	-67.8928	-2.6640	-19.5706	0.0006	7.33
	4	17	-67.0362	-1.8744	6.8420		
		15	-67.0362	-1.8744	-13.7760	0.0005	7.33
	5	17	-94.1818	-1.4527	5.3185		
		15	-94.1818	-1.4527	-10.6608	0.0004	7.33
7	1	15	-2.2285	99.0754	-465.6297		
		18	-2.2285	92.6346	-386.0701	0.0006	0.41
	2	15	-2.3861	100.9508	-475.2823		
		18	-2.3861	94.4166	-394.2048	0.0007	0.41
	3	15	-1.5445	67.4192	-316.9224		
		18	-1.5445	63.0409	-262.7815	0.0004	0.41

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	15	-1.3679	65.8555	-306.0892		
		18	-1.3679	61.4772	-253.2461	0.0004	0.41
	5	15	-1.4720	90.2644	-419.6374		
		18	-1.4720	84.2594	-347.2101	0.0006	0.41
18	1	18	-2.2285	92.6346	-386.0701		
		19	-2.2285	66.7938	-120.6218	0.0074	1.52
	2	18	-2.3861	94.4166	-394.2048		
		19	-2.3861	68.2012	-123.4462	0.0075	1.52
	3	18	-1.5445	63.0409	-262.7815		
		19	-1.5445	45.4752	-82.1021	0.0050	1.52
	4	18	-1.3679	61.4772	-253.2461		
		19	-1.3679	43.9115	-77.7740	0.0048	1.51
	5	18	-1.4720	84.2594	-347.2101		
		19	-1.4720	60.1668	-106.7404	0.0066	1.52
9	1	19	-2.2285	66.7938	-120.6218	164.8430	8.33
		20	-2.2285	-66.9413	-121.8509	-0.1733	8.33
	2	19	-2.3861	68.2012	-123.4462	169.4748	8.33
		20	-2.3861	-68.3470	-124.6613	-0.1778	8.33
	3	19	-1.5445	45.4752	-82.1021	112.4797	8.33
		20	-1.5445	-45.5847	-83.0146	-0.1182	8.33
	4	19	-1.3679	43.9115	-77.7740	104.9953	8.32
		20	-1.3679	-44.0228	-78.7020	-0.1118	8.33
	5	19	-1.4720	60.1668	-106.7404	143.4356	8.32
		20	-1.4720	-60.4406	-109.0226	-0.1525	8.32
0	1	20	-2.2285	-66.9413	-121.8509		
		21	-2.2285	-92.8597	-388.7184	0.0075	1.82
	2	20	-2.3861	-68.3470	-124.6613		
		21	-2.3861	-94.6411	-396.8514	0.0076	1.82
	3	20	-1.5445	-45.5847	-83.0146		
		21	-1.5445	-63.2032	-264.6903	0.0051	1.82

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

LEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	20	-1.3679	-44.0228	-78.7020		
		21	-1.3679	-61.6413	-255.1610	0.0049	1.82
	5	20	-1.4720	-60.4406	-109.0226		
		21	-1.4720	-84.6055	-351.2497	0.0067	1.82
21	1	21	-2.2285	-92.8597	-388.7184		
		22	-2.2285	-99.3005	-468.4649	0.0006	0.42
	2	21	-2.3861	-94.6411	-396.8514		
		22	-2.3861	-101.1753	-478.1152	0.0007	0.42
	3	21	-1.5445	-63.2032	-264.6903		
		22	-1.5445	-67.5814	-318.9660	0.0004	0.42
	4	21	-1.3679	-61.6413	-255.1610		
		22	-1.3679	-66.0195	-308.1403	0.0004	0.42
	5	21	-1.4720	-84.6055	-351.2497		
		22	-1.4720	-90.6106	-423.9643	0.0006	0.42
2	1	22	88.7009	1.1502	-8.3303		
		23	88.7009	1.1502	4.3218	0.0004	3.62
	2	22	89.5885	1.6914	-12.2920		
		23	89.5885	1.6914	6.3137	0.0005	3.63
	3	22	60.1510	0.9222	-6.6884		
		23	60.1510	0.9222	3.4555	0.0003	3.63
	4	22	59.4071	0.3152	-2.2458		
		23	59.4071	0.3152	1.2218		
	5	22	84.5871	-1.3340	9.8727		
		23	84.5871	-1.3340	-4.8013	-0.0004	3.70
5	1	24	-101.8250	1.3656	-4.8695		
		22	-101.8250	1.3656	10.1519	-0.0003	7.28
	2	24	-102.8439	2.0683	-7.4363		
		22	-102.8439	2.0683	15.3146	-0.0005	7.30
	3	24	-69.0508	1.1086	-3.9670		
		22	-69.0508	1.1086	8.2274	-0.0003	7.29

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	24	-68.1969	0.3206	-1.0886		
		22	-68.1969	0.3206	2.4379		
	5	24	-97.1025	-1.8873	7.0389		
		22	-97.1025	-1.8873	-13.7219	0.0004	7.36
24	1	22	-2.0132	91.2254	-449.9827		
		25	-2.0132	85.5108	-376.6372	0.0006	0.41
	2	22	-2.0092	91.2571	-450.5086		
		25	-2.0092	85.5426	-377.1367	0.0006	0.41
	3	22	-1.3581	61.6204	-304.0501		
		25	-1.3581	57.7609	-254.5069	0.0004	0.41
	4	22	-1.3625	61.5845	-303.4565		
		25	-1.3625	57.7250	-253.9431	0.0004	0.41
	5	22	-2.0253	91.0790	-447.5589		
		25	-2.0253	85.3645	-374.3349	0.0006	0.41
5	1	25	-2.0132	85.5108	-376.6372		
		26	-2.0132	62.5149	-129.4341	0.0074	1.53
	2	25	-2.0092	85.5426	-377.1367		
		26	-2.0092	62.5467	-129.8277	0.0074	1.53
	3	25	-1.3581	57.7609	-254.5069		
		26	-1.3581	42.2299	-87.5223	0.0050	1.53
	4	25	-1.3625	57.7250	-253.9431		
		26	-1.3625	42.1940	-87.0785	0.0050	1.53
	5	25	-2.0253	85.3645	-374.3349		
		26	-2.0253	62.3686	-127.6206	0.0074	1.53
6	1	26	-2.0132	62.5149	-129.4341	154.3797	9.08
		27	-2.0132	-47.6451	-10.4753	-0.1582	8.52
	2	26	-2.0092	62.5467	-129.8277	154.2746	9.08
		27	-2.0092	-47.6133	-10.3607	-0.1580	8.52
	3	26	-1.3581	42.2299	-87.5223	104.2371	9.08
		27	-1.3581	-32.1701	-7.0443	-0.1068	8.52

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

EL M NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	26	-1.3625	42.1940	-87.0785	104.3550	9.07
		27	-1.3625	-32.2060	-7.1749	-0.1070	8.52
	5	26	-2.0253	62.3686	-127.6206	154.8661	9.06
		27	-2.0253	-47.7914	-11.0031	-0.1590	8.51
27	1	27	-2.0132	-47.6451	-10.4753		
		28	-2.0132	-75.1851	-256.1356	0.0054	2.32
	2	27	-2.0092	-47.6133	-10.3607		
		28	-2.0092	-75.1533	-255.8940	0.0054	2.32
	3	27	-1.3581	-32.1701	-7.0443		
		28	-1.3581	-50.7701	-172.9248	0.0036	2.32
	4	27	-1.3625	-32.2060	-7.1749		
		28	-1.3625	-50.8060	-173.1990	0.0037	2.32
	5	27	-2.0253	-47.7914	-11.0031		
		28	-2.0253	-75.3314	-257.2487	0.0054	2.32
8	1	28	-2.0132	-75.1851	-256.1356		
		29	-2.0132	-80.8996	-320.9108	0.0004	0.42
	2	28	-2.0092	-75.1533	-255.8940		
		29	-2.0092	-80.8679	-320.6428	0.0004	0.42
	3	28	-1.3581	-50.7701	-172.9248		
		29	-1.3581	-54.6296	-216.6657	0.0003	0.42
	4	28	-1.3625	-50.8060	-173.1990		
		29	-1.3625	-54.6655	-216.9697	0.0003	0.42
	5	28	-2.0253	-75.3314	-257.2487		
		29	-2.0253	-81.0460	-322.1453	0.0004	0.42
9	1	29	38.5236	20.8733	-153.0080		
		30	38.5236	20.8733	76.5980	0.0248	3.67
	2	29	38.5085	20.8569	-152.8863		
		30	38.5085	20.8569	76.5400	0.0248	3.67
	3	29	26.0141	14.0933	-103.3077		
		30	26.0141	14.0933	51.7188	0.0168	3.67

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	29	26.0312	14.1119	-103.4458		
		30	26.0312	14.1119	51.7847	0.0168	3.67
	5	29	38.5933	20.9514	-153.5844		
		30	38.5933	20.9514	76.8808	0.0249	3.67
30	1	31	-42.3760	22.8864	-83.8479		
		29	-42.3760	22.8864	167.9028	-0.0248	7.33
	2	31	-42.3594	22.8662	-83.7716		
		29	-42.3594	22.8662	167.7565	-0.0248	7.33
	3	31	-28.6155	15.4514	-56.6076		
		29	-28.6155	15.4514	113.3580	-0.0168	7.33
	4	31	-28.6343	15.4744	-56.6940		
		29	-28.6343	15.4744	113.5239	-0.0168	7.33
	5	31	-42.4526	22.9767	-84.1830		
		29	-42.4526	22.9767	168.5609	-0.0249	7.33

R E A C T I O N S

NODE NO	LOAD COMB	PX	PY	MOMENT
	Units :	K	K	K -Ft

DA COMBINATIONS:

OMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2
+ 1.40 X CASE 3
+ 1.40 X CASE 4

OM 2 : 1.40 X CASE 1
+ 1.70 X CASE 2
+ 1.70 X CASE 3
+ 1.70 X CASE 4

OMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2
+ 1.00 X CASE 3
+ 1.00 X CASE 4

OM 4 : 1.00 X CASE 1
+ 1.00 X CASE 2
+ 1.00 X CASE 3

R E A C T I O N S

NODE NO	LOAD COMB	FX	FY	MOMENT
OMB 5 :	1.40 X CASE 1			
	+ 1.70 X CASE 5			
1	1	-20.9557	38.5914	-76.9081
	2	-20.9566	38.5919	-76.9120
	3	-14.1564	26.0672	-51.9536
	4	-14.1554	26.0666	-51.9492
	5	-20.9867	38.6254	-77.0078
2	1	22.9677	42.4505	-84.1373
	2	22.9680	42.4511	-84.1376
	3	15.5166	28.6739	-56.8427
	4	15.5163	28.6733	-56.8423
	5	23.0188	42.4879	-84.3402
9	1	1.2389	84.9121	4.4088
	2	1.2547	84.8956	4.4644
	3	0.9558	57.1256	3.4173
	4	0.9378	57.1442	3.3540
	5	2.4838	82.4860	9.0277
10	1	-1.8251	97.4756	6.8686
	2	-1.8493	97.4567	6.9604
	3	-1.3850	65.5778	5.1933
	4	-1.3576	65.5992	5.0892
	5	-3.3876	94.6905	12.5263
16	1	-2.7109	87.3612	-9.9807
	2	-3.2481	88.2503	-11.9536
	3	-2.0504	59.1421	-7.5448
	4	-1.4477	58.3960	-5.3314
	5	-1.1089	82.0428	-4.0719
17	1	3.5136	100.2870	-12.8294
	2	4.2174	101.3077	-15.4062
	3	2.6640	67.8928	-9.7329
	4	1.8744	67.0362	-6.8420
	5	1.4527	94.1818	-5.3185
23	1	1.1502	88.7009	4.3218
	2	1.6914	89.5885	6.3137
	3	0.9222	60.1510	3.4555

R E A C T I O N S

NODE NO	LOAD COMB	FX	FY	MOMENT
	4	0.3152	59.4071	1.2218
	5	-1.3340	84.5871	-4.8013
24	1	-1.3656	101.8250	4.8695
	2	-2.0683	102.8439	7.4363
	3	-1.1086	69.0508	3.9670
	4	-0.3206	68.1969	1.0886
	5	1.8873	97.1025	-7.0389
30	1	20.8733	38.5236	76.5980
	2	20.8569	38.5065	76.5400
	3	14.0933	26.0141	51.7188
	4	14.1119	26.0312	51.7847
	5	20.9514	38.5933	76.8808
31	1	-22.8864	42.3760	83.8479
	2	-22.8662	42.3594	83.7716
	3	-15.4514	28.6155	56.6076
	4	-15.4744	28.6343	56.6940
	5	-22.9767	42.4526	84.1830

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CHECK ANAL. BY MOMENT DIST.

$K_{SB} = 6.04(3.12)(12800)/25(12) = 804$

$K_{AB} = 5.34(3.49)(67500)/11(12) = 9530$

$K_t = 9(3.12)(12925)/[300(1-.1)^3] = 1660$

$K_{ec} = 2(9530)(2)(1660)/2(9530)+2(1660) = 2827$

$C_{N_1}/\ell_1 = .1$

$C_{N_2}/\ell_2 = .1$

$w = .136(1.4) + .05(1.7) = .275^{ksf}(25) = 6.885^{klf}$

$m_{NF} = .0936$

JOINT	1	2		3		4		5
MEMBER	1-2	2-1	2-3	32	3-4	4-3	4-5	5-4
DF	.221	.181	.181	.181	.181	.181	.181	.221
COF	.60	.60	.60	.60	.60	.60	.60	.60
FEM	+403	-403	+403	-403	+403	-403	+403	-403
COM	0	-53.4	0	0	0	0	+53.4	0
	5.8	0	-5.8	0	0	5.08	0	-5.8
	.6	-0.8	-.6	.6	-.6	.6	+.8	-.6
Σ	409.4	-457.2	396.6	-402.4	402.4	-396.6	457.2	-409.4
DM	-90.5	11.0	11.0	0	0	-11.0	-11.0	+90.5
NEG M	318.9	-446.2	407.6	-402.4	402.4	-407.6	446.2	-318.9

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Project GSA-USFS-HVAC
Subject FLOOR ANAL.
Project No. 91062.005 Date 3/4/92 By

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SLAB BEAM "F" & "G" - COL. LINE #3

TOP BARS = 26 #5, 14 #5 } $A_s = 12.4\ in^2$

BOTTOM BARS = 22 #5, 14 #5 } $A_s = 11.16\ in^2$

NEG. MOMENT @ DROPPED PANEL:

$M_u = 475^{1-k}$

$d = 10.31"$

$$a = \frac{12.4(40)}{.85(3)(100)} = 1.945"$$

$$\phi M_n = \frac{1}{12}(.9)\left[12.4(40)\left(10.31 - \frac{1.945}{2}\right)\right]$$

$\phi M_n = 347^{1-k} < 475^{1-k}$ X N.G.

NEG. MOMENT @ 8" SECTION

$M_u = 123^{1-k}$ $d = 6.31"$

$$a = \frac{12.4(40)}{.85(3)(300)} = 0.648"$$

$$\phi M_n = \frac{1}{12}(.9)\left[12.4(40)\left(6.31 - \frac{.648}{2}\right)\right]$$

$\phi M_n = 223^{1-k} > 123^{1-k}$ ✓ OK

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SLAB BEAM "F" - COL. LINE 3

$A_s = 11.16\ IN^2$ $\quad M_u = 169^{1-k}$

$d = 6.31\ IN$

$$a = \frac{11.16(40)}{.85(3)(300)} = 0.584$$

$$\phi M_n = \frac{1}{12}(.9)\left[11.16(40)\left(6.31 - \frac{.584}{2}\right)\right]$$

$$\phi M_n = 201.5^{1-k} > 169^{1-k} \quad \checkmark \text{ OK}$$

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SLAB BEAM "F" @ COL. LINE #4

TOP BARS = 30 #5, 16 #5 } $A_s = 14.26 in^2$

NEG. MOMENT @ DROPPED PANEL

$M_u = -478^{1-k}$ $\quad d = 10.31"$

$$a = \frac{14.26(40)}{.85(3)(100)} = 2.24"$$

$$\phi M_n = \frac{1}{12}(.9)\left[14.26(40)\left(10.31 - \frac{2.24}{2}\right)\right]$$

$\phi M_n = 393^{1-k} < 478^{1-k}$ X N.G.

NEG. MOMENT @ 8" SECTION

$M_u = -129.8^{1-k}$ $\quad d = 6.31"$

$$a = \frac{14.26(40)}{.85(3)(300)} = 0.746$$

$$\phi M_n = \frac{1}{12}(.9)\left(14.26(40)\left(6.31 - \frac{.746}{2}\right)\right]$$

$= 254^{1-k} > 129.8^{1-k}$ ✓ OK

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